

CONTINUOUS CONVEYOR BELT

TECHNICAL FIELD

The present invention relates to a continuous conveyor belt and more specifically, to a continuous conveyor belt which propels a stream of objects into free flight, and through an adjacent sorting station.

BACKGROUND OF THE INVENTION

The prior art is replete with numerous examples of continuous conveyor belts utilized in combination with assorted other manufacturing devices to achieve various objectives.

For example, the prior art includes conveyor assemblies which are utilized in combination with imaging and air ejector mechanisms to effectively remove defective products and other undesirable debris from a stream of bulk products which have been propelled into free flight by the conveyor assembly and through an adjoining inspection station. An example of a prior art assembly having these characteristics is manufactured by Key Technology, Inc., of Walla Walla, Washington, under the trademark "Tegra". This device includes imaging devices which have implementing hardware and software which not only recognizes color and size, but also the shape of the products being carried by the associated conveyor assembly. The software and related hardware allows the imaging devices to detect color subtleties beyond human vision. Further, the imaging devices used in this same assembly facilitates spacial resolution by means of square pixels which provides enhanced visual acuity with respect to the color and shape of the products as they are propelled by the associated conveyor into free flight. In this same sorting device, defective products are removed from the air-borne product stream by an air ejector mechanism which directs accurately timed air pulses at the centroid of the individual products. These timed pulses of air effectively removes the defective products from the product stream as they pass through a sorting station. Still further, this present device employs a catenary belt profile which utilizes centrifugal stabilization to provide a stable product feed stream through the inspection station and improved trajectory following propulsion from the end of the conveyor assembly. In addition, the imaging assembly, and air ejector mechanism can also be employed with a substantially planar or flat belt instead of the catenary belt profile disclosed above. This assembly including the implementing hardware and software is disclosed in detail in application Ser. No. PCT/US96/12814, the teachings of which are incorporated by reference herein.

While the prior art devices have operated with varying degrees of success, there have been shortcomings which have detracted from their usefulness. For example, there is a tendency for bulk product delivered to such conveyor assemblies (both planar and catenary profiles) to roll or otherwise move laterally relative to the direction of movement of the conveyor belt as it is being carried in the direction of the inspection station. This lateral movement of the bulk product on the conveyor assembly is not desirable inasmuch as the given trajectory of the bulk products, once launched into free flight by the conveyor assembly, tends to be less than predictable. Consequently, ejector mechanisms, as described above, must be positioned at some distance from the product stream or pattern. In view of this spacial relationship, the action of the air ejectors may not be optimal in removing undesirable products from the overall product stream.

Still further, another shortcoming which has detracted from the performance of the prior art devices has been the propensity for the bulk products moving through the sorting station to be oriented in such a position that the imaging devices employed with same cannot see the entire surface area of the individual products passing through the sorting station. When this event occurs, some products may pass through the inspection station with undetected anomalies which would normally have rendered them undesirable from an end user standpoint.

An improved modular, continuous conveyor belt for transporting a stream of objects to an inspection station is the subject matter of the present application.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described below with reference to the following accompanying drawings.

FIG. 1 is a perspective, environmental view of a sorting device which employs the continuous conveyor belt of the present invention.

FIG. 2 is a diagrammatic, greatly simplified, vertical, sectional view taken from a position along line 2—2 of FIG. 1.

FIG. 2A is a somewhat reduced diagrammatic, greatly simplified, side elevation view of an alternative form of the invention.

FIG. 3 is a plan view of an individual link employed with the continuous conveyor belt assembly of the present invention.

FIG. 4 is a side elevation view of an individual link employed in the continuous conveyor assembly of the present invention.

FIG. 5 is a perspective, plan view of a discrete section of the continuous conveyor belt assembly of the present invention carrying several objects to be inspected.

FIG. 6 is a perspective, plan view of a discrete section of the continuous conveyor belt assembly of the present invention, and which is shown in an alternate configuration.

FIG. 7 is a greatly simplified schematic representation of a prior art device employing the continuous conveyor belt assembly of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

This disclosure of the invention is submitted in furtherance of the constitutional purposes of the U.S. Patent Laws "to promote the progress of science and useful arts" (Article 1, Section 8).

In accordance with one aspect of the present invention, a continuous conveyor belt for transporting a stream of objects to an inspection station comprises a plurality of links matingly joined together to form a surface for supporting the objects for movement along a given path of travel to the inspection station, and wherein the continuous conveyor belt is entrained between a drive roller and a nose bar which has a given diametral dimension, and wherein the continuous conveyor belt propels the objects into free flight and in a given air-borne pattern through a sorting station which is disposed downstream of, and in spaced relation relative to, the nose bar, and wherein the individual links when passing about the nose bar effectively minimizes the size of the air-borne object pattern passing through the sorting station, while simultaneously providing the objects in predetermined spaced relationship for imaging purposes.